



media kit

# TDRS-L

tracking and data relay satellite

*continuing the critical lifeline*

A space communications satellite, launching from Cape Canaveral, Florida aboard an Atlas V 401 rocket. Learn more at:

<http://tdrs.gsfc.nasa.gov>



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**Table of Contents:**

Media Services Information  
ULA's Atlas V Launch Vehicle Diagram  
Launch Services Program Overview  
Spacecraft Quick Facts  
TDRS-L Illustration  
TDRS Milestones  
NASA Program/Project Management

***For detailed, up-to-date information about the TDRS-L launch, check:***

***<http://tdrs.gsfc.nasa.gov>***

## **Media Services Information**

### **TDRS-L Briefings and Events Coverage**

*(All times Eastern)*

News conferences, events and operating hours for the news center at NASA's Kennedy Space Center in Florida are set for the launch of Tracking and Data Relay Satellite-L, or TDRS-L, aboard a United Launch Alliance Atlas V 401 rocket Jan. 23. The 40-minute launch window extends from 9:05 to 9:45 p.m. EST. Liftoff will occur from Space Launch Complex 41 at Cape Canaveral Air Force Station in Florida.

Launch commentary coverage, as well as prelaunch media briefings, will be carried live on NASA Television and the agency's website.

### **Prelaunch News Conference - Tuesday, Jan. 21 at 1 p.m.**

Briefing participants are:

- Badri Younes, deputy associate administrator, Space Communications and Navigation (SCaN), NASA Human Exploration and Operations Mission Directorate, Washington
- Tim Dunn, NASA launch director, Kennedy Space Center, Fla.
- Vernon Thorp, program manager, NASA Missions, United Launch Alliance, Denver, Colo.
- Jeffrey Gramling, NASA TDRS-L project manager, Goddard Space Flight Center, Greenbelt, Md.
- Andy Kopito, Civil Space Programs director, Boeing Space & Intelligence Systems, El Segundo, Calif.
- Clay Flynn, launch weather officer, 45th Weather Squadron, Cape Canaveral Air Force Station, Fla.

### **Accreditation and Media Access Badges for Kennedy Space Center**

Media who want to cover the TDRS-L prelaunch news conference and the launch must apply for credentials at:

<https://media.ksc.nasa.gov/>

Media may obtain their access badge at the Gate 2 Pass and Identification Building for the news media on State Road 3. Two forms of government issued identification, one with a photo, will be required in order to receive a badge to cover the prelaunch news conference, the Atlas V launch vehicle rollout to the pad and the launch. For further information about accreditation, contact Jennifer Horner at 321-867-6598 or 867-2468.

The press accreditation office (PIDS) for the news media on SR 3 will be open on Jan. 21 & 22 between 8:00 a.m. and 4:30 p.m. On Jan. 23, the hours are from 8:00 a.m. until 1 a.m.

### **Atlas V Launch Vehicle Rollout**

Wednesday, Jan. 22: There will be a media opportunity to observe rollout of the Atlas V rocket from the Vertical Integration Facility to the launch pad. Media should be at Kennedy's Press Site at 9 a.m. for transportation to the viewing location near Space Launch Complex 41.

### **Remote Camera Placement at Space Launch Complex 41**

Wednesday Jan. 22: Photographers who wish to set up remote sound-activated cameras at the Atlas V launch pad will be transported to Space Launch Complex 41. Media should meet in the Kennedy Press Site parking lot at 2 p.m.

### **Launch Day Press Site Access**

Thursday, Jan. 23: Media will cover the TDRS-L launch from Kennedy's Press Site. Access will be through Gate 3 on State Road 405, east of the Kennedy's visitor complex and through Gate 2 on State Road 3.

### **Kennedy News Center Hours**

Tuesday & Wednesday, Jan. 21 & 22: 8 a.m. - 4:30 p.m.  
Thursday, Jan. 23: 8 a.m. - 1:30 a.m.

### **NASA Television Coverage**

On Tuesday, Jan. 21, NASA Television will carry the TDRS-L prelaunch news conference live beginning at 1 p.m. EST.

On Thursday, Jan. 23, NASA Television coverage of the launch will begin at 6:30 p.m. EST and conclude after the TDRS-L spacecraft has separated from the Atlas V, which occurs one hour, forty-six minutes after launch. Live launch coverage will be carried on all NASA Television channels.

A post-launch news conference will not be held. A post-launch news release will be issued as soon as the state-of-health of the TDRS-L spacecraft is known. Spokespersons also will be available at the press site to answer questions.

For NASA Television downlink information, schedule information and streaming video, visit:

[www.nasa.gov/ntv](http://www.nasa.gov/ntv)

Audio only of the press conferences and the launch coverage will be carried on the NASA "V" circuits, which may be accessed by dialing 321-867-1220 or -1240 or -1260 or -7135. On launch day, "mission audio," the launch conductor's countdown activities



without NASA TV launch commentary, will be carried on 321-867-7135 starting at 5:30 p.m. Launch also will be available on local amateur VHF radio frequency 146.940 MHz heard within Brevard County.

### **NASA Web Prelaunch and Launch Coverage**

Extensive prelaunch and launch day coverage of the liftoff of the TDRS-L spacecraft aboard an Atlas V rocket will be available on NASA's home page on the Internet at:

[www.nasa.gov](http://www.nasa.gov)

A prelaunch webcast for the TDRS-L mission will be streamed on [www.nasa.gov/tdrs](http://www.nasa.gov/tdrs). The launch blog will be on <http://blogs.nasa.gov/tdrs-L>. Recorded status begins Tuesday, January 21. Coverage features live updates as countdown milestones occur, as well as streaming video clips highlighting launch preparations and liftoff. For questions about countdown coverage, contact Jeanne Ryba at 321-867-7824.

To view the webcast and the blog or to learn more about the TDRS-L mission, visit:

[www.nasa.gov/ntv](http://www.nasa.gov/ntv)

### **Social Media**

Join the conversation and follow the TDRS-L mission online by using the #TDRS on Twitter and Facebook at:

[http://www.twitter.com/NASA\\_TDRS](http://www.twitter.com/NASA_TDRS)  
<https://www.facebook.com/NASA.TDRS>

Throughout the launch countdown, the NASAKennedy Twitter and Facebook accounts will be continuously updated throughout the launch countdown at:

<http://www.twitter.com/NASAKennedy>  
<https://www.facebook.com/NASAKennedy>

### **Recorded Status**

Recorded status reports and updates to the media advisory on the TDRS-L launch will be provided through the Kennedy media phone line starting Tuesday, Jan. 21. The telephone number is 321-867-2525.

### **Wireless Capability**

Wireless capability for news media is available at Kennedy's Press Site.

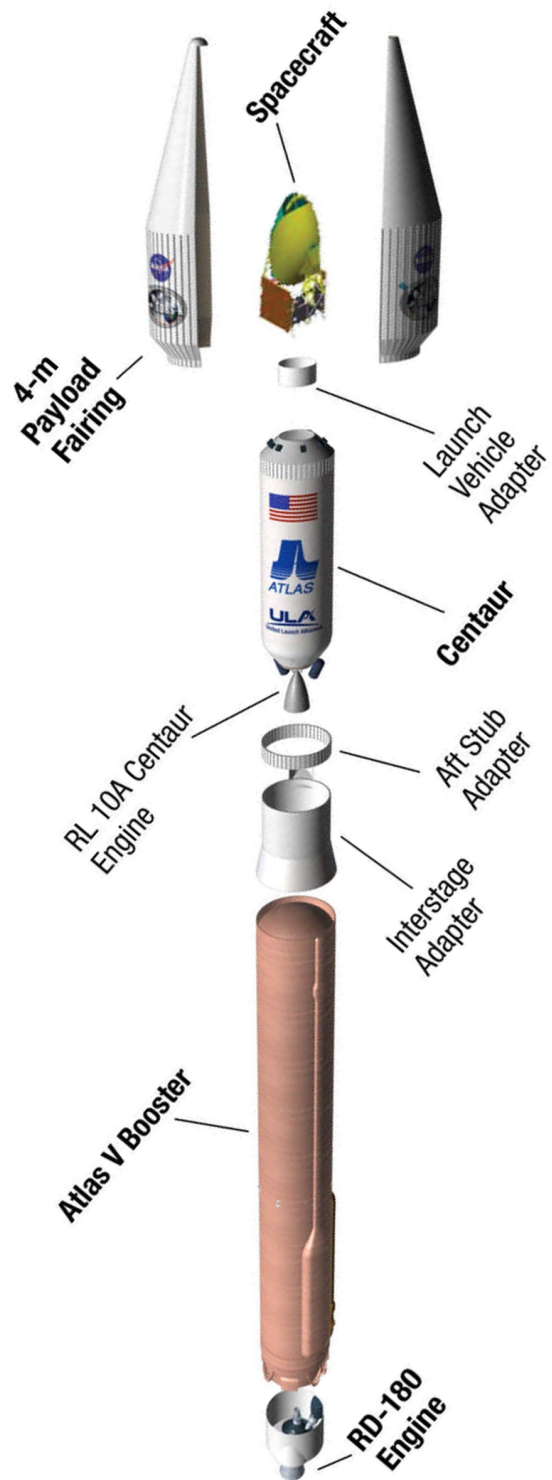
## **The TDRS-L Launch**

NASA's Space Communications and Navigation Program, part of the Human Exploration and Operations Mission Directorate at NASA Headquarters in Washington, is responsible for the TDRS network. The TDRS spacecraft project is managed by the agency's Goddard Space Flight Center in Greenbelt, Md. NASA's Launch Services Program at Kennedy Space Center is responsible for launch management. United Launch Alliance is the provider of the Atlas V launch service.

For the latest information on the TDRS-L mission, visit:

<http://tdrs.gsfc.nasa.gov>

## Atlas V Launch Vehicle Diagram



## **Launch Services Program Overview**

NASA turns to the engineers and analysts in its Launch Services Program to send robotic spacecraft on their way for some of the most exciting and notable missions in the agency's history.

The Launch Services Program, known as LSP, is based at NASA's Kennedy Space Center in Florida and boasts a roster of engineers and technicians who specialize in all aspects of rocketry and spacecraft integration. LSP selects the appropriate launch vehicle for a specific mission's spacecraft. In this case, the United Launch Alliance Atlas V rocket will lift the latest Tracking and Data Relay Satellite, a spacecraft known as TDRS-L, into orbit. Sometimes, this selection process takes place years before the first launch opportunity. The program then provides oversight as the designs of the rocket and mission are integrated with each other.

As liftoff nears, teams oversee the rocket's engineering and manufacture and integration with the spacecraft. LSP conducts the countdowns for NASA's scientific missions and provides additional quality assurance, along with other controls, to ensure a successful mission.

Working with commercial rocket builders, planners have a number of commercial launch providers and launch vehicle models to choose from, ranging from Orbital Sciences Corp.'s small, air-launched Pegasus or Lockheed Martin's Athena launch vehicle to United Launch Alliance's workhorse Delta II rocket or its powerhouse Atlas V. The catalog is growing, too, with the recent addition of SpaceX's Falcon 9 and Orbital's new Antares rockets.

LSP moved its operations to Kennedy in 1998, becoming the first program based at the nation's premiere launch site. Since then, LSP has assisted in launching orbiters, landers and rovers to Mars; huge observation spacecraft to Jupiter; and the New Horizons mission to Pluto and the Kuiper Belt, two astronomical locations that have never before been seen up-close.

Because different spacecraft fly in different orbits, LSP operates several launch centers around the world. Cape Canaveral Air Force Station in Florida is adjacent to Kennedy and hosts launches to place spacecraft in orbits that remain close to the equator. The LSP launch team goes to Vandenberg Air Force Base in California to run launches that require spacecraft to fly around the world in a north-to-south orbit, known as a polar orbit. LSP also conducts launches from Kwajalein Atoll in the Marshall Islands; Kodiak Island, Alaska; and NASA's Wallops Flight Facility on Virginia's eastern Shore.

To learn more about LSP, rockets and NASA missions go to:

<http://www.nasa.gov/centers/kennedy/launchingrockets/index.html>

## **TDRS-L Quick Facts**

The Tracking and Data Relay Satellite (TDRS) Project is providing follow-on and replacement spacecraft necessary to maintain and expand NASA's Space Network. The contract to build the next generation of TDRS spacecraft, known as TDRS-K and L, was awarded to [Boeing Space Systems](#) in December 2007. An option to the contract was exercised in November 2011, adding the development of TDRS-M. TDRS-K was launched January 2013 and TDRS-L is scheduled for launch in January 2014. TDRS-M completion date is late in 2015. The contract also included the modifications to the White Sands Complex (WSC) ground system required to support these new spacecraft.

The TDRS Project was established in 1973 and is responsible for the development, launch, and on-orbit test and calibration of TDRS spacecraft. There have been four procurements of TDRS spacecraft, which include the Basic Program (TDRS-F1-F6), the Replacement Program (TDRS-F7), the TDRS-H,I,J Program, and the TDRS-K, L, M Program. TDRS Flight 7 was a replacement for Flight 2, which was lost on Challenger. The first seven spacecraft (TDRS-F1-F7) are referred to as the First Generation, the H, I, J series as the Second Generation, and the K, L, M series the Third Generation. TDRS-F1-F7 spacecraft were built by TRW (now Northrop Grumman) in Redondo Beach, CA. Hughes (now Boeing) in El Segundo, CA built the TDRS-F8-F10 (H, I, J) spacecraft.

The TDRS system (TDRSS), also known as NASA's Space Network, consists of the on-orbit TDRS telecommunications spacecraft stationed at geosynchronous positions and the associated TDRS ground terminals located at White Sands, New Mexico and Guam. The Space Network is capable of providing near-continuous high bandwidth (S-, Ku-, and Ka-band) telecommunications services for low-Earth orbiting user spacecraft and expendable launch vehicles, including the Hubble Space Telescope, the International Space Station, and NASA's Earth Observing Fleet. As such, TDRS is a critical agency resource.

This next generation space communications satellite is part of a follow-on spacecraft fleet being developed and deployed to replenish NASA's Space Network. The TDRS Project Office at Goddard Space Flight Center manages the TDRS development effort. The Space Network is the responsibility of the [Space Communications and Navigation \(SCaN\)](#) office within the [Human Exploration and Operations \(HEO\) Mission Directorate](#) at NASA Headquarters in Washington D.C. Operations of the network are the responsibility of the [Space Network Project](#) at Goddard.

### **Spacecraft Details:**

*Dimensions:* During the launch configuration, the TDRS-L spacecraft measures 320.5 inches from the spacecraft's lowest point to the tip of the forward omni antenna. When deployed the TDRS-L spacecraft spans 829 inches from the tip of one solar array to the other.



*Weight:* Approximately 3,454 kilograms (7,615 lbs.) at launch (wet mass).

*Power:* Silicon solar cell arrays generate 3,220 watts of power during the autumnal equinox and 2,850 watts during the summer solstice. Nickel-hydrogen batteries supply spacecraft power during solar eclipses.

### **Spacecraft Payload:**

The TDRS spacecraft is comprised of two main elements; the spacecraft bus, and the communications systems payload.

The TDRS spacecraft uses the Boeing Space Systems 601 bus. The Boeing 601 body is composed of two modules: the primary structure that carries all launch vehicle loads and contains the propulsion subsystem, bus electronics, and battery packs; and a structure of honeycomb shelves that hold the communications equipment, electronics, and isothermal heat pipes. Reflectors, antenna feeds, and solar arrays mount directly to the payload module, and antenna configurations can be placed on three faces of the bus.

### **Payload Services:**

#### *S-band Multiple Access (MA)*

The phased array antennas are designed to receive signals from up to five spacecraft simultaneously and transmit to one at a time. Improvements in the multiple access performance and on-board processing have contributed to an increased return data. The third generation forward (ground-to-space) service transmitting power is also increased.

#### *S-band Single Access*

Two 15-foot diameter mechanically steerable antennas providing high-gain support to satellites with low-gain antennas or multiple access user satellites temporarily requiring an increased data rate. The antennas support manned missions such as the International Space Station, science data missions, including the Hubble Space Telescope, and satellite data dumps.

#### *Ku-band Single Access*

The two large antennas also operate at a higher frequency band supporting two-way high-resolution video and customer science data.

#### *Ka-band Single Access*

Also offered by the two single access antennas, Ka-band provides even higher frequency services for large volumes of science data. This frequency allows users to transmit data at 800 Mbps. Originally established on the TDRS H, I, & J spacecraft, the Ka-band frequencies allow for continued international compatibility with Japanese and European space relay programs, enabling mutual support in case of emergencies.

**Satellite Navigation:** In addition to telemetry, command, and mission data communication services, TDRS-L will continue to provide tracking data used to determine the orbit and specific location of user satellites.

**Mission Lifetime:** The on-orbit design life of TDRS-L is 15 years.

**Engineering Handover from Boeing to NASA:** L + 15 days - Boeing completes transfer orbit; hands over to WSC for on-orbit test phase; L + approximately 64 days – spacecraft acceptance by NASA and handover for operations.

**Launch Vehicle:** ULA's Atlas V/401 Rocket

**Launch Site:** Space Launch Complex 41, Cape Canaveral Air Force Station

**Launch Date/NET Window:** January 23, 2014, 9:05 p.m. - 9:45 p.m. EST

**Spacecraft Separation:** Launch + 1 hour 46 minutes

**First Satellite Signal Acquisition:** Launch + 70 seconds via the Universal Space Network antenna in Dongara, Australia.

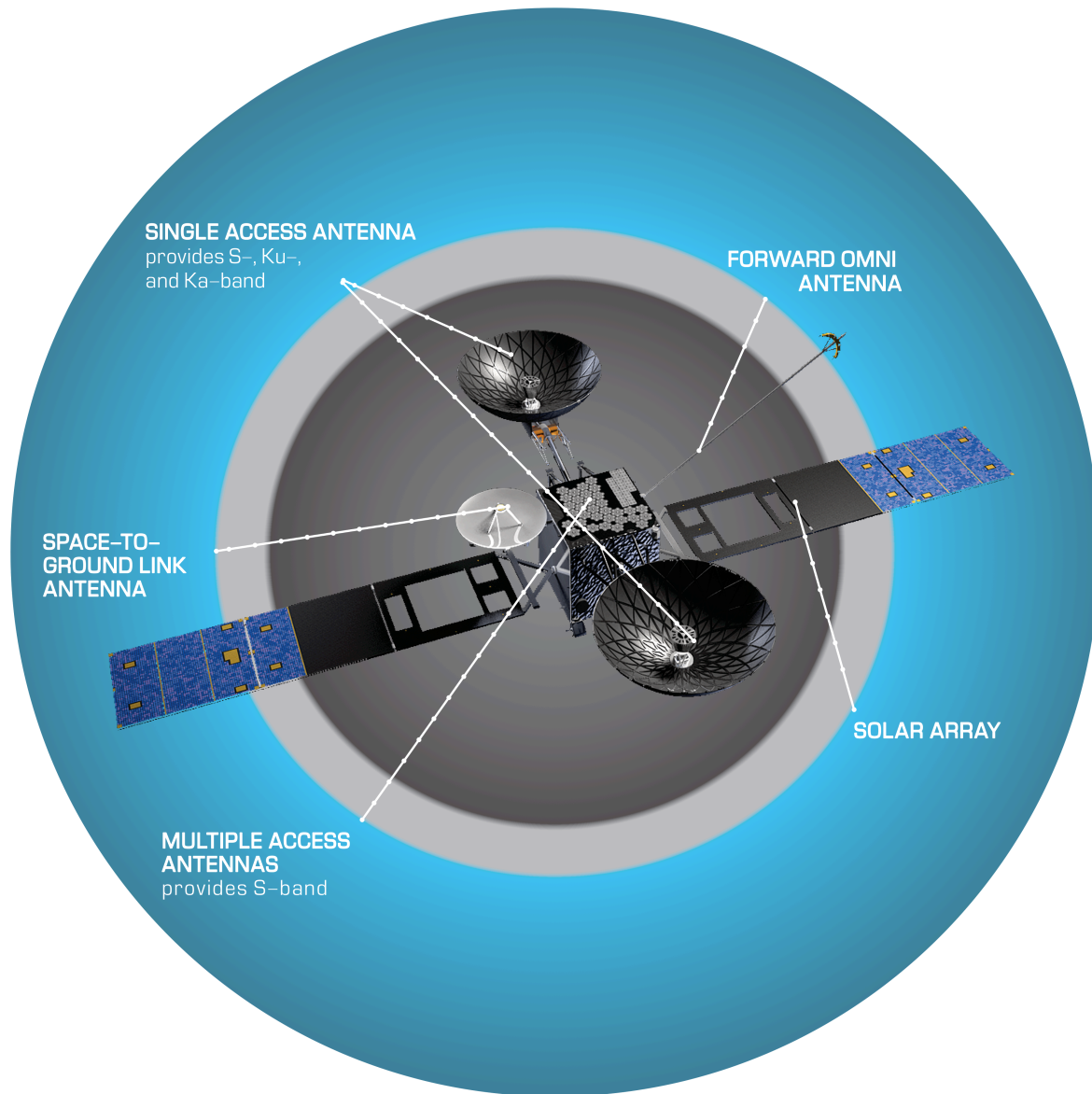
**Cost:** The TDRS-K and L spacecraft and the White Sands Complex modifications cost approximately \$715 million.

**Mission Oversight:** Upon government acceptance, Goddard's Space Network Project Office will assume mission oversight and determine where to locate the spacecraft based on operational needs.

**TDRS Operational Locations:**

TDRS-1:	Retired
TDRS-2:	Lost Aboard the Space Shuttle Challenger
TDRS-3:	On orbit, currently in storage located at the Atlantic Ocean Region, above the Northeast Coast of Brazil
TDRS-4:	Retired
TDRS-5:	In service, currently located at the Pacific Ocean Region, above the Phoenix Islands
TDRS-6:	In service, currently located in the Atlantic Ocean Region
TDRS-7:	In service, currently located in the Indian Ocean Region
TDRS-8:	In service, currently located in the Indian Ocean Region
TDRS-9:	In service, currently located at the Atlantic Ocean Region, above the Northeast Coast of Brazil
TDRS-10:	In service, currently located at the Pacific Ocean above the Phoenix Islands
TDRS-11:	Ongoing in service testing, currently located in the Pacific Ocean Region

## TDRS-L Illustration



### **NASA's Space Network Milestones**

1973	TDRS Project is established
1979	White Sands Ground Terminal (WSGT) goes on line
July 1981	White Sands Ground Terminal completed in White Sands, NM.
April 4, 1983	Launch of TDRS-1 aboard STS-6 from the Kennedy Space Center.
August 1983	First TDRS customer support occurs with Landsat-4 mission; First Space Shuttle (STS-8) test communications support occurs through TDRS-1
January 28, 1986	Launch of TDRS-2 aboard STS-51L from the Kennedy Space Center; Lost in the Challenger Accident.
September 29, 1988	Launch of TDRS-3 aboard STS-26 from the Kennedy Space Center
November 1988	Dual TDRS-1 and TDRS-3 support begins
March 13, 1989	Launch of TDRS-4 aboard STS-29 from the Kennedy Space Center
August 2, 1991	Launch of TDRS-5 aboard STS-43 from the Kennedy Space Center
January 13, 1993	Launch of TDRS-6 aboard STS-54 from the Kennedy Space Center
December 1993	Compton Gamma Ray Observatory experiences an on-board tape recorder failure (3/1992), prompting the closer of the TDRS Zone of Exclusion to minimize science data loss. NASA established temporary TDRS capability in Canberra, Australia
April 1994	Second TDRSS Ground Terminal completed in White Sands, NM.
July 13, 1995	Launch of TDRS-7 aboard STS-70 from the Kennedy Space Center
February 1996	Upgrades completed to the White Sands Ground Terminal in White Sands, NM.
September 1996	Guam Remote Ground Terminal implementation Phase II efforts begin.
July 1998	The Guam Remote Ground Terminal becomes operational; forever closing the Zone of Exclusion
Jan 1999	NASA implements South Pole TDRSS Relay, allowing National Science Foundation to receive/transmit data from South Pole. Relay also assists in resolving a medical emergency at the Pole.
June 30, 2000	Launch of TDRS-8 aboard an Atlas IIA from Cape Canaveral
March 8, 2002	Launch of TDRS-9 aboard an Atlas IIA from Cape Canaveral
July 2002	TDRS-1 support first telemedicine procedure from South Pole. Doctors in Massachusetts assist a physician at Amundsen-Scott South Pole Station in knee surgery.
December 4, 2002	Launch of TDRS-10 aboard an Atlas IIA from Cape Canaveral
December 2007	Contract is issued to Boeing to develop the third generation TDRS spacecraft

June 2010	TDRS-1 Decommissioned
November 2011	First of two options exercised, adding the development of TDRS-M.
March 2012	TDRS-4 Decommissioned
January 30, 2013	Launch of TDRS-11 aboard a United Launch Alliance Atlas V from Cape Canaveral.
January 23, 2014	TDRS-L is scheduled for launch.



## **Program Management**

NASA is responsible for the procurement of the construction, integration and verification testing of the spacecraft, instruments and unique ground equipment. NASA coordinates the launch of the spacecraft. NASA's comprehensive on-orbit verification period is expected to last 3 months after launch. NASA also designs, develops and operates the ground system needed to acquire, process and disseminate the satellite data.

The TDRS Project Office at Goddard Space Flight Center manages the TDRS acquisition and development. The Space Network is the responsibility of the [Space Communications and Navigation \(SCaN\)](#) office within the [Human Exploration and Operations \(HEO\) Mission Directorate](#) at NASA Headquarters in Washington D.C. Operations of the network is the responsibility of the [Space Network Project](#) at Goddard.

### **NASA Management:**

#### **Headquarters (Program Office)**

Badri Younes, Deputy Associate Administrator for Space Communications and Navigation

Pete Vrotsos, Network Services Director for Space Communications and Navigation

William Marinelli, TDRS Program Executive Space Communication and Navigation Program

#### **Goddard Space Flight Center (TDRS Project Office)**

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David Littmann, TDRS Deputy Project Manager

Lorrie Eakin, TDRS Deputy Project Manager for Resources

Robert Buchanan, TDRS Deputy Project Manager for Technical

Michele Rook, TDRS Contracting Officer